STEEL WIRE TIES – THE NEXT GENERATION

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Abstract

Labor costs have long remained a significant portion of total gin costs. A large percentage of these costs are directly associated with the application of bale ties at the bale press. Until now, attempts to automate this process with alternative materials have proven costly and unreliable.

Introduction

Steel wire ties have historically provided the most reliable and economical bale ties in the industry. Changing market conditions have created the need for automation with a super strong bale tie. The Ultra Twist® Tying System meets this need by providing a method to automatically apply steel wire around a bale.

Discussion

Current Conditions

For the past two decades, bale tie application methods have fallen into four categories: 1) hand applied wire ties, 2) semi-automatically applied wire ties, 3) automatically applied plastic flat strap, and 4) automatically applied steel flat strap

Factors that have influenced a gin's choice of bale tie methods include bale tie material cost (cost per bale), labor cost and availability, equipment cost, equipment reliability, throughput capacity, and bale tie performance.

In 1998, 87% of all US bales were tied with steel wire ties. It is estimated that 24% of these bales were applied semi-automatically. Plastic strap accounted for 9%, and steel strap 4%.

Hand applied wire ties remain the standard bale tie due to material cost (cost per bale), ease of use, and bale tie performance. Tie failure rates of less than 2% are a general rule. Application methods include platen bars and/or return chutes similar to Car-Loker® platen bars and Car-Loker® chute systems. These systems are inexpensive and can be easily operated with untrained labor.

Semi-automatically applied wire ties are popular when labor availability is tight and/or throughput capacity is high (cycle time less than 12 seconds). When set up properly, these systems provide bale tie performance equal to hand applied operations.

Automatically applied plastic flat strap systems have provided full automation to those who desire it. In 1998, however, plastic bale tie performance had fallen short of expectations. Improvements made in 1999 are inconclusive to date.

Automatically applied steel strap use has been declining over the past several years due to several of the factors mentioned above. Less than 10 domestic gins currently use this product.

The Next Generation

In 1999, International Fiber Packaging requested a 1999 test program from the JCIBPC that would incorporate all of the benefits of steel wire into an automatically applied package. We were awarded a first year test of 50,000 bales. Our engineers immediately embarked on a project that we feel has the potential to rewrite automatically applied bale packaging specifications for years to come.

The Ultra Twist® Design Objectives

1. Three tying heads mounted into a mobile positioning unit.
2. Maintain track alignment independent of lower follow block.
3. 6-tie configuration, 88" tie length.
4. Total cycle time less than 13 seconds.
5. Utilize 10 gauge Ultra Hi-Ten galvanized wire.
6. Wire strength: 2,930 pounds, average (Figure 1).
7. Joint strength: 2,580 pounds, average (Figure 2).
8. Recess wire ties.

The Installation – Petersburg Coop Gin

The first Ultra Twist® system was built and installed for Petersburg Coop Gin in Petersburg, Texas. This gin is a 5 stand plant using 3 Lummus 158 gins and 2 Lummus 128 gins. They use a Lummus Gin Dor-Les® press. Typical gin rates range from 35-40 bales per hour. Total estimated bale production for the 1999 crop year is 50,000 bales.

The installation and start-up went smoothly with the normal minor problems experienced with a new piece of equipment. Press modifications included drilling and tapping mounting holes in the top sill, rebuilding the upper and lower follow blocks, installing floor safety mats, and adding electrical interlocks between the Ultra Twist® control system and the press/bale handling control system (Figures 3, 4, 5).

We initially applied an 89" tie instead of an 88" tie due to a miscalculation with the press platen separation. This was corrected in early December.

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Tie performance to date has exceeded all expectations. As of this writing, there have been zero reported tie failures. This includes some rough handling when two bales fell off of a truck in route to the warehouse at a speed of 65 mph. The bales were torn and dirty, but securely packaged with 6 ties per bale.

Machine performance also has exceeded expectations. Several areas of improvement have been identified such as wear parts, alignment methods, and wire feeding mechanisms. These items have been addressed and will be incorporated on the 2000 models.

Summary

The Ultra Twist® tying system promises to be a significant addition to International Fiber Packaging's product line and continued refinement is ongoing. The system is available on a limited basis during the JCIBPC test program. Full commercial approval is expected for the 2002 crop year.

References

Simpson, S.A. February 22, 1999. Staff Report, Packaging Trends, Joint Cotton Industry Bale Packaging Committee meeting, Charlotte, NC.

National Cotton Council. June 1999. 1999 Specifications for Cotton Bale Packaging Materials.

Acknowledgements

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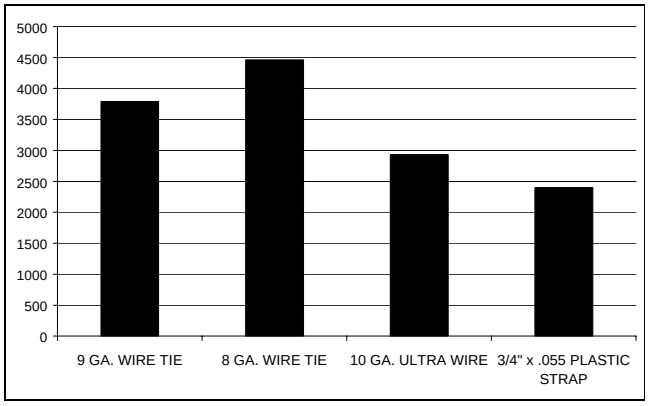

Figure 1. Bale Tie Material Comparison (lbs.).

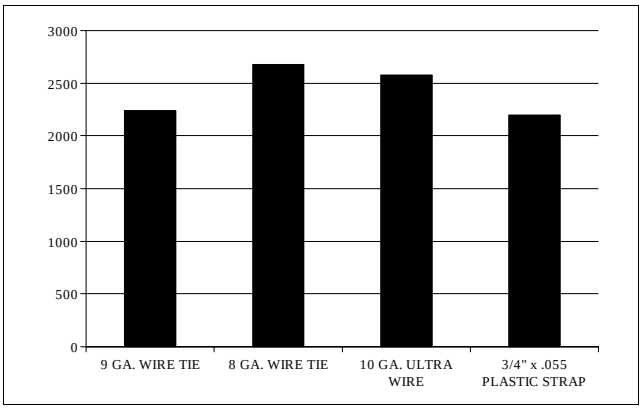

Figure 2. Bale Tie Joint Comparison (lbs.).

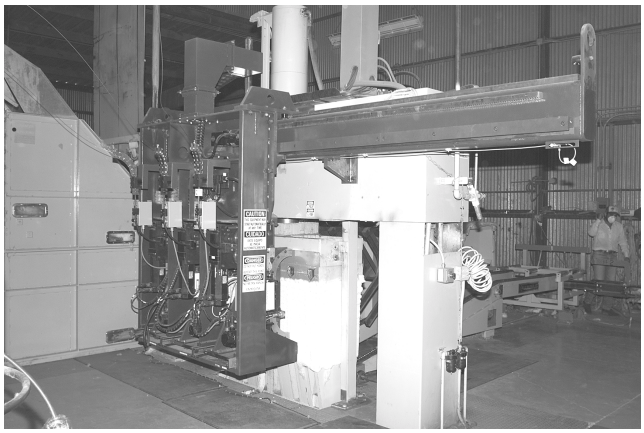

Figure 3. Ultra Twist®, head side.

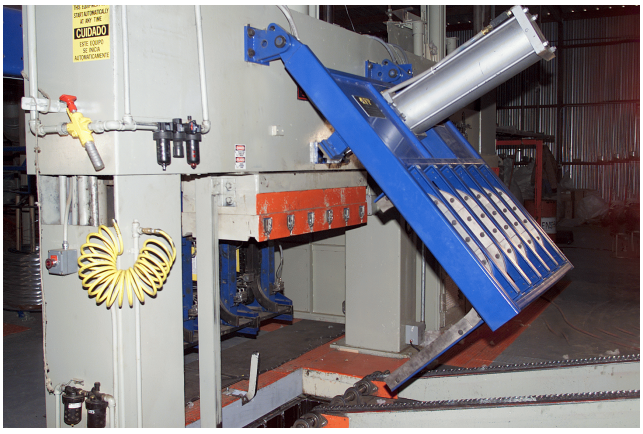

Figure 4. Ultra Twist®, exit side.

Figure 5. Ultra Twist®, knot close-up.